

AMENDMENT UNDER 37 C.F.R. § 1.114(c)
Application No.: 09/867,596
Atty Docket No.: Q61608

REMARKS

The Advisory Action of December 30, 2003 has been received and its contents carefully considered.

Claims 7 to 26 are all the claims pending in the application prior to the present amendment.

At pages 2 and 3 of the Advisory Action, the Examiner sets forth various comments in response to the arguments that applicants submitted in the Amendment Under 37 C.F.R. § 1.116 filed on November 21, 2003.

In response, applicants have amended claim 21 to direct it to a carbon black having a primary particle size of 100 nm or less and an X-ray crystallite plane spacing C_0 or 0.6730 nm or less, and having a boron content in a range of 0.001 to 5% by mass, which shows a volume resistivity of $0.1\Omega\cdot\text{cm}$ or less in the pressurized state under a pressure of 2 MPa.

Thus, applicants have amended claim 21 to incorporate the recitations of claims 22 to 24, which have now been canceled.

Further, applicants have amended claim 25 and 26 in view of the amendments to claim 21.

Applicants set forth the following comment on a number of the points raised by the Examiner.

(1) The Examiner takes the position that the use of boron carbide instead of boric acid achieves “slightly different results”. In response, applicants submit that the difference in results are not slight, but are of practical importance and are unexpected.

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Although the numerical values for the x-ray crystallite plane spacing C_0 appear to be close to each other, applicants submit that the small changes in the numerical values are important.

As described in the present specification at page 14, lines 18-25, heat treatment using a boric acid does not attain enough reduction in the C_0 value, that is, sufficient graphitization does not proceed. By such a heat treatment using a boric acid, the C_0 value of less than 0.680 nm cannot readily be obtained, much less the value of 0.6730 nm or less.

Carbon black is known as being non-graphitizable and is difficult to graphitize. However, according to the present invention, graphitization of carbon black having a primary particle size of 100 nm or less, with the C_0 value being less than 0.6730 nm, can be achieved by mixing boron carbide having a particle size of 40 μ m or less with carbon black and heat-treating the mixture. That is, a big difference in the results between boron carbide and boric acid lies in the capability (boron carbide) and incapability of (boric acid) of graphitizing carbon black which is “non-graphitizable”.

With respect to the C_0 value, as described in the specification at page 3, lines 19-23, the theoretical upper limit of the d_{002} value for complete graphite is 0.3354 nm, that is, the C_0 value, which is obtained by doubling the d_{002} value, is 0.6708 nm. C_0 values are precise values for X-ray crystallite plane spacing, which are measured by X-ray diffraction. The Examiner does not consider the difference in C_0 values between the present invention (0.680 nm) and JP ‘351 (0.6826 nm:Example 1) as big enough to distinguish the present invention from JP ‘351. However, applicants have amended claim 21 to claim the C_0 value of 0.6730 nm or less, which is

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very close to the theoretical value 0.6708 nm, and is clearly distinguishable from JP '351 which does not include any teaching or suggestion about obtaining carbon black having a C_0 value of 0.6730 nm or less.

(2) The Examiner also states that applicants have argued that the prior art does not show the use of boron carbide ground to a specific size. The Examiner responds by arguing that applicants have not shown the effect of the particle size of boron carbide on the graphite product, and that it would be obvious to employ small particles.

In response, applicants point out that as described in the specification at page 12, line 23 to page 13 line 1, use of boron carbide ground to a preferable particle size of 40 μm ensures the effect obtainable by addition of boron carbide and enhances the yield and productivity.

(3) The Examiner also comments on the temperature arguments. Applicants have argued that JP '351 does not employ a temperature of at least 2500°C. The Examiner responds by pointing out that the highest value shown in JP '351 is 2500°C.

In response, applicants point out that although carbon black was heat-treated at 2,400°C in Example 1 of JP '351, the C_0 value obtained in the Example was 0.6826 nm, which is high as compared with the C_0 values obtained in the presently claimed invention. In other words, preparation of the carbon powder of the presently claimed invention requires not only heat-treatment at 2500°C or higher, but also use of boron carbide, preferably having a particle size of 40 μm or less, as a graphitization-promoting substance. This is not disclosed or suggested by JP '351.

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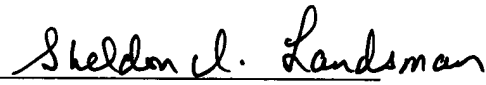
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In view of the above, reconsideration and allowance of this application are now believed to be in order, and such actions are hereby solicited. If any points remain in issue which the Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly requested to contact the undersigned at the telephone number listed below.

The USPTO is directed and authorized to charge all required fees, except for the Issue Fee and the Publication Fee, to Deposit Account No. 19-4880. Please also credit any overpayments to said Deposit Account.

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23373

CUSTOMER NUMBER

Date: January 21, 2004